ROYAL ASTRONOMICAL SOCIETY.

VOL. XVI. *May* 9, 1856. No. 7.

MANUEL J. JOHNSON, Esq., President, in the Chair.

New Planet.

On the 22d of May a new planet was discovered by M. Goldschmidt. It resembles a star of the 11.12th magnitude. The following approximate positions of it were obtained by him:—

	M. T. Paris. h m	A.R. h m s	Dec. ° ′
1856, May 22	10 20	10 22 15	+10 11
23	11 30	10 23 1	11 15
25	11 10	10 26 10	+11 5

The object observed on the 23d of May does not seem to have been the planet.

The planet discovered on the 31st of March by M. Goldschmidt has been called *Harmonia* in commemoration of the peace.

Observations of Double Stars taken at Madras in 1853, 4, 5, *and the beginning of* 1856. By Eyre B. Powell, Esq.

The equatoreal with which these observations were taken is the same that was used in obtaining the places of Comet II., 1854, recorded in the *Monthly Notices* for June of that year. The object-glass of the telescope is 4 inches in diameter, with a focal length of 63·2 inches. The mounting of the equatoreal is of the German form; and the right ascension and declination circles, which, with their verniers, read respectively to seconds of time and minutes of space, were intended only to find objects or give a rough approximation to their places. The value of a division of the screw-head was found to be $0''{\cdot}3156$. "The instrument," says the author, "is the workmanship of Mr. Simms, and it certainly supports his well-established reputation."

The author then enters into some details with respect to the

mode of observation practised by him. The measures are almost wholly of positions; the author being under the belief that a more powerful instrument and a clock-work movement (which he did not at first possess) were indispensable to the accurate measurement of distances.

The author concludes his introductory remarks with expressing the obligations under which he rests to Captain Jacob for the assistance he kindly afforded him when he began to cultivate an acquaintance with double stars.

The number of stars in the *Catalogue* is 130. Appended to it are a few notes on some of the stars. The following are a few extracts:—

"83. (*α Centauri.*) The observations of this star had extreme care expended upon them. As a general rule, they were taken only when the components were steady and well defined, and the vertical section of the eye was made to coincide with the line of junction of the stars; the position of the observer's head, too, was reversed in the middle of several sets, and many of the angles were measured by daylight.

"The orbit of *α Centauri*, which I laid before the Society in 1854, is undoubtedly erroneous in several particulars; and I believe with Captain Jacob that a thoroughly good set of elements will not be attainable for some years. Still we may arrive at tolerably safe conclusions on certain points. In the first place, it seems likely that the limits within which the period lies are narrower than have been supposed. On drawing the interpolating position and distance curves there is seen to be a necessity for modifying the position and distance for 1831·95 derived from the St. Helena Diff. Decl. = 16″·2, and Diff. R.A. = 1ˢ·54, and therefore for altering the differences themselves. The curves give P = 216°—40′±, D = 19″·3 ±, and consequently Diff. Decl. = 15·48; but Diff. Decl. = 14″·82 for 1833·0 by Henderson's Cape Observations; hence the annual variation of Diff. Decl. at that time = —·66, a result according with the general tenor of the measures. From this it follows that Diff. Decl. = 16·2 corresponds to 1830·8; and as La Caille's Diff. Decl. = 16·2 belongs to 1752·1 ±, the period comes out 78·7 years. Again, P = 216—40, D = 19·3, afford a Diff. R.A. = 1ˢ·543, which exactly agrees with Mr. Johnson's result, and harmonises fairly with that of Henderson. Taking the Diff. R.A. of the latter as based upon the greater number of observations, and comparing it with Dunlop's, which equals 1ˢ·783 for 1826·4, the variation of Diff. R.A. = —0ˢ·263 for 6·6 years, and Diff. R.A. = 1ˢ·673 corresponds to 1829·16; but La Caille's Diff. R.A. = 1ˢ·673 for 1752·1±, therefore we have 77·06 years for the length of the period. Using Mr. Maclear's Diff. Decl. 10″·75 for 1840·0 and the position 223°—10′ suggested by the interpolating curve, the distance for the same epoch = 14″·74. Comparing this with Sir John Herschel's distance = 16·18 for 1837·345, —1·44 equals variation of distance for 2·655 years; and 15″·5 equals the distance for 1838·599. But 15·5± is Maskelyne's distance for

1761·5. Consequently the period from these data is 77·099 years. In the note on *α Crucis*, reasons are assigned for believing the space of 79 years to be a superior limit of the period. Combining, then, that result and the preceding ones, it appears highly probable that the period lies between 77 and 79 years.

"By cutting up the area swept over by the projected radius vector since 1826 into various sectors, and examining the latter in connexion with the position and distance curves, the area for the interval between 1826·4 and 1855·318, or 28·918 years, is found to be 57·0954 square seconds, affording an annual sector of 1·974 square seconds. Hence for 77·6 years, a portion of time probably very near the true value of the period, the area is 153·18 square seconds, which, therefore, cannot differ much from the space contained within the apparent orbit. The comparison of the several sectors with the mean areal motion, and the contemporaneous inspection of the position and distance curves, lead us to infer that—the observed distance for 1846·21 is considerably too great—the one for 1848·01 is somewhat too small—and the sector from 1850·37 to 1854·029 also falls short of the true value, owing, probably, to slight errors of defect in the distances. A strong suspicion, moreover, is excited that Dunlop's position is too small, and his distance too great. The comparison of the sectorial areas is of importance for several reasons; among others, inasmuch as it seems almost impossible to reconcile the distance for 1846·21 with that for 1848·01; whence, therefore, it becomes necessary to decide upon the one that should be preferred as more or less of a guide in drawing the apparent ellipse. Mr. Hind's orbit, published in the *Monthly Notices* for January 1855, and one I have lately calculated, present a curious contrast on this point; but both agree in attaching an error of nearly a second to one of the distances. Thus:

Epoch.	P. Obs.	P. Hind.	P. Powell.	D. Obs.	D. Hind.	D. Powell.
	°	°	°	″	″	″
1846·21	232·38	232·92	233·1	10·91	10·34	9·95
1848·01	238·0	237·5	237·95	8·03	8·94	8·55

the sum of the errors of distance being exactly the same for both orbits. Setting aside the internal evidence of the observations, it appears far more likely that the distance for 1846·21 is erroneous to a large extent, than that the distance for 1848·01 should be so. The former is deduced from only sixteen measures, taken at the commencement of a series of observations; the latter is the mean of forty-eight measures, taken after two years' practice. The axes of the apparent ellipse are still involved in a little doubt; the Cape meridional observations of 1842 and 1844 favouring a less excentric ellipse, and agreeing in this respect with the distance for 1846·21; the measures in general, however, support the idea of the perspective orbit being peculiarly compressed.

"The position of the periastre is subject to very slight uncertainty; it can differ but little from 32°.

" The measures of 1855 and 6 prove that calculators, myself included, have considerably antedated the time of periastral passage; that event can scarcely happen before 1862.

" Six orbits, which I computed in 1855, introducing the latest measures, and in the graphical part using the scale of a quarter of an inch to a second, and one that I calculated at the beginning of this year, making use of the positions and distances just obtained, and drawing the apparent ellipse on the large scale of half an inch to a second, all agreed in placing the passage in 1862 or 1863 +. At the same time, the observation of Feuillée, in 1709·5, which belongs to a position of the *comes* past the periastre, taken with a period of 78 years, will hardly allow of the passage occurring later than the commencement of 1864.

" To fix with exactitude the node, inclination, excentricity, and semi-major axis, more especially the last, some additional years of observing will be required.

" The most satisfactory set of elements, at which I was able to arrive in 1855, is as follows:—

Apparent Orbit.

$a = 14''{\cdot}8$ $b = 3''{\cdot}3$ $e = {\cdot}95028$

Greater maximum dist.	= 25·4	Pos. for do.	= 207° 30′ ±
Less do. do.	= 4·68	Do.	= 3° ±
Greater minimum dist.	= 3·73	Do.	= 311° ±
Less do. do.	= ·73	Do.	= 94° 30′ ±

Area of Ellipse = 153·5 square seconds.

Real Orbit.

$\tau = 1862{\cdot}03$

$\pi = 32°\ 30'$

$\Omega = 14\ 45$

$\gamma = 77\ 20$

$\lambda = 55\ 35$

$e = {\cdot}85968$

$n = +\ 4{\cdot}6655$

Period = 77·16 years

$a = 20''{\cdot}8945$

Area of projected ellipse $= \pi a^2 \sqrt{1 - e^2} \cos \gamma = 153{\cdot}7$ square seconds.

" The measures of 1856 imply that the preceding elements will require some modifications, as P_c is getting in advance of P_o, while D_c is beginning to fall short of D_o. Probably, the values of τ, Ω, γ, e, n and a, will have to undergo changes of about + ·6 year, + 2°, — 2°, — ·06, — 0°·06 and — 2″ respectively. Still the elements given above are more consonant with the observations up to 1855·3. The accompanying Table shows the extent to which an agreement exists between the orbit and observation up to 1855·3.

Epoch.	Pc	Po	Pc—Po	Dc	Do	Dc—Do	Observer.
	° ′	° ′	′	″	″		
1826·4	213 50	213 11	+39	21·92	22·45	—·53	Dunlop
1832·16	216 57	216 21	+36	19·19	19·85	—·66	Johnson and Taylor
1833·0	217 28	217 27	+1	18·75	18·67	+·08	Henderson
1834·79	218 42	218 33	+9	17·73	17·4	+·33	Herschel
1837·345	220 44	220 44	0	16·18	16·18	0	Herschel
1840·0	223 19	223 10	+9	14·44	14·74	—·3	Maclear Diff. Dec. = 10·74 and P from Curve
1847·09	235 18	235 6	+12	9·26	9·45	—·19	Jacob
1848·01	237 57	238 0	—3	8·55	8·03	+·52	Jacob
1850·37	247 16	247 31	—15	6·75	6·52	+·23	Jacob
1851·05	250 58	251 15	—17	6·25	5·90	+·35	Jacob
1852·561	261 34	262 46	—72	5·21	5·03	+·18	Maclear
1853·049	265 54	267 34	—100	4·91	4·55	+·36	Jacob
1854·029	276 18	276 38	—20	4·39	4·2	+·19	P by Jacob & Powell, D. by Jacob
1855·047	289 41	289 3	+38	4·00	...	...	Powell
1855·318	293 34	293 38	—4	3·93	4·07	—·14	Powell

"There is, undoubtedly, error attaching to some one or more of the three positions for 1851, 2, and 3; this is established by the irregularities which the increments of the angular velocities display, and is also indicated by the agreement on this point of all orbits of the star.

"92. *Serpentis.*

Epoch.	Pos.	Observer.
1782·99	227·2	W. Herschel
1821·33	199·22	J. Herschel & South
1829·5	198·4	J. Herschel
1842·35	196·2	Smyth
1853·303	193·07	Powell

"This star is undoubtedly in motion; but, as is remarked in the *Cycle*, its retrogradation is slower than was at first imagined. Perhaps Sir W. Herschel's angle should be 207·2; if so, all the observations would harmonise pretty well.

"99. σ *Coronæ Borealis.* Captain Jacob's orbit for this star, contained in the *Monthly Notices* for April 1855, and my own, published in the *Monthly Notices* for January 1855, approximate to each other in most respects; the chief differences are in the excentricity and mean motion. In my computations I found that the earlier measures favour an increase, and the later a decrease of the mean motion; since the more recent observations are probably the more exact, I am inclined to think that my periodic time is too short, instead of too long, as Captain Jacob's results imply. However, the lapse of some years is requisite to settle this point.

"108. 70 *Ophiuchi.* I have devoted considerable attention to this binary, as well in investigating its orbit as in measuring its

position angles; and while I cannot resist the evidence borne by the results of such accurate observers as the Rev. Mr. Dawes, Captain Jacob, and Mr. Fletcher, with regard to the diminution of the distance, I am unable to reconcile the comparatively great change in that element with the companion's slow motion in angle. I have attempted, but with no good success, to improve upon the orbits I arrived at in 1854, and which appeared in the *Monthly Notices* for December of that year. Although a fresh set of elements, derived from the solution of equations of condition, afforded a better series of distances, the corresponding angular errors were much increased.

"As remarks have been made, assuming that the distance, according to my orbit of 1854, is still on the increase, I may be allowed to mention that such is not the case; the maximum was reached about two years ago.

"126. *Cycle* 836. This star is well worthy of attention, the *comes* having described an angle of about 6° in a retrograde direction since 1834·79. The distance also has undergone a considerable decrease.

Epoch.	Pos.	Dist.	Observer.
1824·8	274·07	7·98	South.
1834·79	272·1	7·5	Smyth.
1855·873	266·12	6·23	Powell.

"As A's proper motion would produce a variation in the position angle contrary to that which has taken place, and B has had no proper motion assigned to it, there exists a strong probability of the physical connexion of the pair."

Observed Right Ascensions and North Polar Distances of recently discovered small Planets obtained from Meridian Observations at the Royal Observatory, Greenwich.

Victoria.

Mean Solar Time of Observation.				Apparent R.A.			Apparent N.P.D.		
	h	m	s	h	m	s	°	′	″
1856, April 4	8	36	9·3	9	29	30·49	86	55	54·39
7	8	24	0·3	9	29	9·25	86	40	34·32

Euphrosyne.

Mean Solar Time of Observation.				Apparent R.A.			Apparent N.P.D.		
	h	m	s	h	m	s	°	′	″
1856, April 4	9	15	36·3	10	9	3·99	47	32	39·78
12	8	42	43·0	10	7	37·73	49	21	30·76

Egeria.

Mean Solar Time of Observation.	Apparent R.A.	Apparent N.P.D.
h m s	h m s	° ′ ″
1856, April 4 9 21 52·6	10 15 21·39	56 45 17·29
15 8 37 24·1	10 14 7·63	58 40 43·89
21 8 14 41·3	10 15 0·44	59 49 58·58

Lætitia.

Mean Solar Time of Observation.	Apparent R.A.	Apparent N.P.D.
h m s	h m s	° ′ ″
1856, April 4 9 51 2·1	10 44 35·61	78 40 17·24
12 9 16 45·9	10 41 46·20	78 8 52·21
16 9 0 7·8	10 40 51·57	77 56 58·07
19 8 47 52·5	10 40 23·93	78 49 47·13
21 8 39 48·6	10 40 11·83	77 45 45·62

Thetis.

Mean Solar Time of Observation.	Apparent R.A.	Apparent N.P.D.
h m s	h m s	° ′ ″
1856, April 4 12 33 26·8	13 27 27·05	89 1 38·45
10 12 4 44·2	13 22 18·97	88 21 33·90
12 11 55 8·3	13 20 34·68	88 9 43·42
21 11 12 8·0	13 12 56·29	87 21 39·12
22 11 7 23·8	13 12 7·81	87 17 9·31
28 10 39 (10),		86 54 46·86

Harmonia.

Mean Solar Time of Observation.	Apparent R.A.	Apparent N.P.D.
h m s	h m s	° ′ ″
1856, April 12 11 36 30·7	13 1 53·96	88 53 31·96
19 11 2 33·9	12 55 27·45	88 22 48·80
21 10 52 58·8	12 53 43·95	88 15 31·13
22 10 48 12·8	12 52 53·67	88 12 9·01
24 10 38 43·6	12 51 16·09	88 5 52·90

The N.P.D.'s are corrected for refraction and parallax.

Note on Variable Stars. By A. D. Wackerbarth, Esq.

"Suppose a nebula, such as that from which the earth, sun, and planets, are supposed to have arisen, existing in space. Such a nebula would probably be composed of elements more or less the same as those whereof our own planet is formed. Some, indeed, of the latter we might suppose wanting, and others present which we possess not here; but on the whole, let us suppose that the chief elements of the earth are found in our nebula, which would thus form an immense spheroïd of nebulous matter revolving round its own minor axis; or rather, if the matter were not quite homogeneously distributed, on an axis passing through its centre of gravity. We may suppose, or not, as we please, that this nebula has a nucleus, as many nebulæ appear to have, and many not to have, any such portion; but in the former case we must suppose some little difference in the constitution of the particles towards the centre or position of the said nucleus. Our nebula, thus composed, may wander a longer or shorter period in space peacefully; but now let us suppose a disturbance such as that which broke up the nebulosity of the mass which forms the planetary system, and condensed it into separate globes. Such disturbance might come from without or from within; there are forces in nature to account for either. We have supposed all or many of the elements present; but in a nebulous form they would be in a finely-divided state, and many of them, perhaps all the baser metals, have such affinity to oxygen, as when, in that state, to take fire on coming in contact therewith; so that any cause, which would bring them and the oxygen into contact, would cause fearful explosions, and set the whole nebula in ignition, condensing it into burning masses, each by the violent explosions casting out smaller fused and burning masses into space, to revolve as burning globes around itself or the centre of gravity of the whole. But what would be the condition of one of these fused and blazing masses? Hydrogen is present as well as oxygen; and ignition must therefore immediately cause the production of water. An ocean is then poured down on the incandescent globe, to be cast up again, as steam, into a damp atmosphere formed by the nitrogen and the watery vapour. Here it cools, and is again poured down in torrents on the glowing mass; and this process must continue until the globe has sufficiently cooled for the water to be able to rest upon its surface. Now I imagine that the appearance of a globe in such a state, viewed at a stellar distance, must be variable; that, when the water is, in the form of steam, driven up into the atmosphere, the burning mass must glow with greater brilliancy; but when, the steam condensing, a boiling ocean is poured upon it, the violence of the conflagration must for a time abate, and thus the object assume a less brilliant appearance until the fire has succeeded in reconverting the water into steam, and driving it up again into the atmosphere.

"Another circumstance may be mentioned as possible, namely,

some bodies may be at present in some parts already to a considerable degree cooled; at least sufficiently to be, at those parts, extinct, while other parts of them are yet fused and burning. Would not the revolution of such a body present the phenomena of a variable star?

"*Uppsala*, 1856, *Apr.* 22."

Description of an Observatory erected at Upper Tulse Hill.
By William Huggins, Esq.

"A short account of an Observatory lately erected by myself at Upper Tulse Hill will not, I think, be considered altogether void of interest, as the building combines, in an unusual manner, the several important advantages of perfect convenience of access, uninterrupted view of the horizon, and freedom from tremor.

"The building, as will be seen by the model, is raised upon columns to a height of sixteen feet above the ground, and is connected by an enclosed passage with the upper story of the cottage.

"It becomes thus, for all purposes of convenience and access, a part of the house; while its elevated position prevents the view of the heavens from being obstructed, as would otherwise be the case, by the cottage and neighbouring trees.

"The stability of the instruments is provided for by two massive, pyramidical columns of brickwork built in cement, and resting upon deep and broad foundations of concrete. These columns pass up through the floor of the building, with which they are wholly unconnected, to a proper height for the reception of the instruments. The iron columns, upon which the building is supported, repose likewise upon solid concrete foundations.

"The building, which is 18 feet long by 12 feet wide, is formed of a strong framework of wood. This is covered externally with plates of corrugated iron. To the inside of the framework a double boarding, with felt placed between, is nailed, and the whole of the interior is hung with varnished oak paper. The dome, 12 feet in diameter, is hemispherical, and rotates easily on three iron balls, running in channels of iron plate. The shutter of the dome, 18 inches wide, extends through slightly more than a quadrant; it runs upon rollers, on parallel ridges, placed outside the dome. The ridges are continued over from horizon to horizon, and the shutter travels over and back again by means of two lines of wire-rope attached to the axle of a small windlass, fixed on the inner side of the curb of the dome. The dome itself consists of a circular wooden curb, bearing a light frame-work of iron, covered over with thin sheet-zinc. The dome is lined with felt and painted oil-cloth. The transit-shutters are arranged in the usual manner.

"The following instruments are at present in the Observatory.

"An equatoreal, by Dollond, 5 inches aperture, and 5 feet focal length; circles 18 inches diameter.

"A transit-circle, by the late Thomas Jones. The telescope has a focal length of 45 inches, and an aperture of 3·25 inches. The circle is 18 inches diameter, with divisions on silver to 5′. The verniers read to 3″.

"The clock is an excellent one, by the late T. Arnold."

Observations of Planets made by Mr. James Breen with the Northumberland Equatoreal at the Cambridge Observatory.

(*Communicated by Professor Challis.*)

Atalanta.

	Greenwich M.T.	R.A.	Par. Corr. × Δ	N.P.D.	Par. Corr. × Δ	No. of Comp.	Star.
	h m s	h m s	s	° ′ ″	″		
1855, Oct. 24	9 30 29·9	22 49 5·39	+0·080	94 54 52·90	−7·16	4	*a*
	10 48 54·5	22 49 4·30	+0·191	94 54 20·72	−7·10	2	*a*
Nov. 3	7 42 21·4	22 48 0·11	−0·023	93 11 31·24	−7·03	4	*b*
Dec. 20	7 27 1·1	23 24 40·15	+0·174			12	*c*
	7 28 25·8			83 36 16·86	−6·20	6	*c*
21	7 17 5·7	23 26 0·57	+0·164	83 22 55·83	−6·16	8	*c*
22	7 0 6·7	23 27 21·53	+0·144	83 9 19·27	−6·13	8	*d*
1856, Jan. 25	7 36 6·1	0 22 46·88	+0·289	75 4 35·31	−5·70	8	*e*

Assumed Mean Places of the Stars.

	Mean R.A. 1855·0.	Mean N.P.D. 1855·0.	Catalogue.
	h m s	° ′ ″	
a	22 46 40·15	95 12 14·81	Bessel XXII. 971
b	22 46 2·83	93 4 27·71	— XXII. 961
c	23 24 50·44	83 42 45·65	— XXIII. 524
d	23 26 46·33	82 58 2·77	— XXIII. 538
	Mean R.A. 1856·0.	Mean N.P.D. 1856·0.	
e	0 23 18·69	74 45 33·71	B.A.C. 116

The assumed R.A. and N.P.D. were derived from the Catalogues named, with the exception of the R.A. of Bessel XXII. 961, which was obtained from two Cambridge Observations in 1850, which gave the R.A. greater than that in Weisse's Catalogue by 1ˢ·63.

Harmonia.

	Greenwich M.T.	R.A.	Par. Corr. × Δ	N.P.D.	Par. Corr. × Δ	No. of Comp.	Star.
	h m s	h m s	s	° ′ ″	″		
1856, Apr. 24	13 8 39·6	12 51 11·17	+0·215	88 5 45·97	−6·61	6	*a*
28	12 27 45·8	12 48 11·96	+0·187	87 55 37·44	−6·58	4	*a*
30	9 52 31·6	12 46 53·91	−0·027	87 51 52·30	−6·55	2	*a*
	10 9 54·4	12 46 53·22 (?)	−0·001	87 51 58·63 (?)	−6·55	7	*b*
May 20	12 25 11·7	12 38 50·71	+0·290	87 56 53·42	−6·64	8	*c*

Assumed Mean Places of the Stars.

	Mean R.A. 1856·0.	Mean N.P.D. 1856·0.	Catalogue.
	h m s	° ′ ″	
a	12 50 6·60	87 47 31·59	Bessel XII. 854
b	12 47 48·35 (?)	87 44 1·45 (?)	Not in Catalogues
c	12 37 57·87	88 9 11·11	Bessel XII. 638

The assumed place of the star *b* depends on a single equatoreal comparison with *a*, and therefore requires correction by further Observations.

Lætitia.

	Greenwich M.T.	R.A.	Par. Corr. × Δ	N.P.D.	Par. Corr. × Δ	No. of Comp.
	h m s	h m s	s	° ′ ″		
1856, May 22	11 38 29·6	10 47 34·59	+0·343	77 58 9·80	6·29	10

The star of comparison was Bessel X. 833. The assumed mean place 1856·0 is, R.A. = $10^h\ 45^m\ 52^s{\cdot}64$, and N.P.D. = 77° 40′ 41″·82.

Astronomical and Meteorological Observations made at the Radcliffe Observatory, Oxford, in the year 1854, *under the Superintendence of Manuel J. Johnson, M.A., Radcliffe Observer.* Vol. XV. Oxford, 1856.

Besides the usual observations with the transit instrument and meridian circle, this volume contains the commencement of the Catalogue of Stars remarkable for physical or other peculiarities, which Mr. Johnson purposes to construct pending the preparation of the *Circumpolar Catalogue* for the press, and to which allusion was made in the last Report of the Council. The number of stars is 835, all of which were observed in 1854. There is also a catalogue of 164 stars within 6° of the pole, which Mr. Johnson contemplates extending from time to time as far as circumstances will admit. The heliometer has been employed exclusively in observations for determining parallax. *Arcturus*, *Castor*, and *α Lyræ*, have been the principal objects of investigation; but as the series of observations had not been in any instance completed, it was considered desirable to postpone their publication. The volume contains a catalogue of variable stars which Mr. Pogson, one of the assistants at the Observatory, drew up originally for his own private use during his leisure hours. This Catalogue has also been published in a separate pamphlet; a brief notice of its contents will be found at p. 185.

The remaining part of the volume is devoted to meteorological observations, and to the results of discussions of such observations. We find in this section the commencement of a regular system of registration by photography, which is now in full operation at the Radcliffe Observatory.

Note de M. Jean Plana sur les pages 60 *et* 61 *du* 1^er^ *volume de sa Théorie du Mouvement de la Lune.*

This memoir of M. Plana contains an admission and correction of an error in his Lunar Theory, relative to the secular acceleration of the moon's mean motion, of which it is impossible to over-estimate the importance. Mr. Adams had drawn attention both to the inadequacy of La Place's theory respecting this secular inequality, and to the serious correction which must be applied to the numerical coefficient of m^4 in its expression, in a remarkable paper, printed in the *Philosophical Transactions* for 1853, Part III., of which a good extract will be found in the *Proceedings of the Royal Society* for that year. His attention had been drawn to this subject while endeavouring to supply an omission in the theory of the moon given by Pontécoulant in his *Théorie Analytique*. In this work, though the author follows Sir J. Lubbock's method of expressing the co-ordinates of the moon directly in terms of the time, yet he unfortunately adopts Plana's results without examination. Mr. Adams, in performing the calculations requisite to complete the defective part of the theory, was surprised to find that the second term of the secular acceleration thus obtained not only differed considerably in magnitude from the corresponding term given by Plana, but was even of a different sign. Referring then to the *Proceedings of the Royal Society*, page 321, for a sketch of Mr. Adams' processes, it will be sufficient here to give his result, compared with that of Plana. This result is only carried to the second term of the function expressing the acceleration, that is, to the fourth power of m (the ratio of the mean motions of the sun and moon), since it was the author's object to exhibit in its simplest form the error which he had discovered. but he at the same time expressed his intention of carrying his approximation still farther, so as to obtain the coefficients with an accuracy sufficient for the calculation of remote eclipses.

The expression obtained by Mr. Adams for the first two terms of the acceleration, was:—

$$-\left(\frac{3}{2}m^2 - \frac{3771}{64}m^4\right) \int (e'^2 - \mathrm{E}'^2)\, n\, dt$$

while, according to Plana's *Théorie de la Lune*, the corresponding expression is,

$$-\left(\frac{3}{2}m^2 - \frac{2187}{128}m^4\right) \int (e'^2 - \mathrm{E}'^2)\, n\, dt$$

The difference of the two expressions is,

$$\frac{5355}{128}m^4 \int (e'^2 - \mathrm{E}'^2)\, n\, dt$$

and the numerical value of the correction is,

$$-\,1''{\cdot}66\left(\frac{t}{100}\right)^2$$

or — 1″·66 multiplied by the square of the number of centuries from a fixed epoch.

In the year 1854, M. Plana published in the *Turin Memoirs* a short note in which he discusses the result arrived at by Mr. Adams. After indicating the pages in his *Théorie*, in which will be found the details of the calculations for the completion of the second term of the function which expresses the secular acceleration, he remarks, "I cannot establish a complete comparison between the result of Mr. Adams and my own, without again going through all the details; which would require a very painful labour, from which I think I may hold myself excused, by the care with which I have published all the intermediate results. By means of them we can always keep before the eyes the proof of the definitive results, upon which we ordinarily concentrate all the importance which they deserve, on the supposition that they are incontestable, whatever may be the complication inherent in their deduction." After a few words of explanation respecting his method, tending to prove that no essential term depending upon the secular variations of the orbit of the earth has been omitted, he concludes his note by recommending the part of his own theory under discussion "to the judgment of all those who would be willing to submit it to a profound and severe examination."

It appears, therefore, that at the time of writing this note, M. Plana had no suspicion of anything defective either in his own processes or in the theory of La Place, nor has any astronomer, from that time to the present, followed his recommendation "to study profoundly the complicated processes" on which his result for the secular acceleration is based. Fortunately, however, the author has recently found occasion to do this himself, and has not only discovered the source of the error, which occasions the discrepancy between his own expression and that of Mr. Adams, but with most commendable activity and energy, has thoroughly traced the effect of it in every term where it produces any sensible effect, and gives the result of his researches in a memoir, which is the chief subject of this article. The chief point for observation is that the correctness of Mr. Adams' expression for the secular acceleration to the second term of the function is fully verified, and thus the necessity is recognised of applying a correction to the mean motion of the moon, which will interfere materially with all recent chronological speculations, and make a recomputation of the elements of all ancient eclipses imperative.

As usual, the source of the error was very simple and obvious, though, singularly enough, it has escaped the notice of all astronomers. M. Plana's account of it is as follows. In treating of the secular variations of the elements of the solar orbit, he has occasion to discuss the integral expressed by the equation,

$$x = \mathrm{B} \int \varepsilon'^{m} \sin (k\nu + \beta - n\tau')\, d\nu$$

which, he says, comprises all the cases of integration which can

present themselves in the research of the co-ordinates of the moon. By means of processes, which it is not necessary to give in detail, he finally arrives at the following equation expressing the value of x,—

$$x = -\frac{B}{k}\varepsilon'^m \cos(k\nu + \beta - n\tau') - \frac{B n\, d\tau'}{k^2 d\nu}\varepsilon'^m \cos(k\nu + \beta - n\tau')$$

$$+\frac{B m}{k^2}\varepsilon'^{m-1}\frac{d\varepsilon'}{d\nu}\sin(k\nu + \beta - n\tau')$$

but by a strange typographical error the last of the three terms given above was omitted in the text near the end of page 61 of the 1st volume of the *Théorie de la Lune*. That this error was purely typographical is evident from the words which follow, namely, " l'on peut réunir ces trois termes en un seul, et poser

$$x = -\frac{B\varepsilon'^m}{k - n\frac{d\tau'}{d\nu}}\cos\left\{k\nu + \beta - n\tau' + \left(k - n\frac{d\tau'}{d\nu}\right)\frac{m}{\varepsilon' k^2}\cdot\frac{d\varepsilon'}{d\nu}\right\}$$

" Thus," he says, " it happened, that, in composing the note of the 17th December, 1854, I did not pay attention to the omission of the term

$$\frac{B m}{k^2}\varepsilon'^{m-1}\frac{d\varepsilon'}{d\nu}\sin(k\nu + \beta - n\tau')$$

which should form part of the value of x which immediately precedes the last. In consequence of this omission I saw only the term multiplied by

$$\varepsilon'^m \frac{d\tau'}{d\nu}$$

and I considered that the one multiplied by

$$m\,\varepsilon'^{m-1}\frac{d\varepsilon'}{d\nu}$$

was destroyed by others. To this circumstance must be attributed my method of recognising (*ma manière de voir*) the non-existence of the periodical terms multiplied by $\frac{d\varepsilon'}{d\nu}$ in the expressions of δu and $\delta n t$. As soon as I had re-established, by performing again the calculations of page 61, the true trinomial in the place of the monomial equal to the value of x, I saw that the integration will introduce secular terms into the integral, namely, products of the form

$$x\,B'\varepsilon'^m \sin(k\nu + \beta - n\tau')\,d\nu;$$

for there will be the term

$$\int \frac{B B' m}{k^2}\varepsilon'^{2m-1}\frac{d\varepsilon'}{d\nu}\sin^2(k\nu + \beta - n\tau')\,d\nu$$

$$= \int \frac{B B' m}{2k^2}\varepsilon'^{2m-1}\,d\varepsilon' = \frac{B B'}{4k^2}\varepsilon'^{2m}.$$

Hence the existence of terms of the form

$$G\,\varepsilon'^{2m-1}\,\frac{d\,\varepsilon'}{d\,\nu}\,(\sin k\,\nu+\beta-n\,\tau')$$

in the expression of δu is incontestable. Their form is similar to that of the term $Q \sin(i\,\nu+\beta)$ of which La Place has remarked the existence at page 214 of the third volume of the *Mécanique Céleste*."

M. Plana then proceeds to investigate the secular terms which will arise from the omitted term of his trinomial; and, after an investigation of considerable length, arrives at precisely the same result as Mr. Adams had obtained by a different process.

He then proceeds with the investigation of three other terms of the same order, arising from the omitted term of the trinomial.

The first of these, which is to replace the corresponding term in the secular equation of the mean motion at page 485 of the first volume of the *Théorie de la Lune*, is

$$-\frac{99}{128}\,m^2\,e^2\int(\varepsilon'^2-\mathrm{E}'^2)\,d\,\nu$$

the term, as it stands at the place cited, being

$$+\frac{1461}{128}\,m^2\,e^2\int(\varepsilon'^2-\mathrm{E}'^2)\,d\,\nu$$

The second term, which must replace the corresponding one on the same page as before, is

$$+\frac{447}{128}\,m^2\,\gamma^2\int(\varepsilon'^2-\mathrm{E}'^2)\,d\,\nu$$

instead of

$$+\frac{525}{128}\,m^2\,\gamma^2\int(\varepsilon'^2-\mathrm{E}'^2)\,d\,\nu$$

Finally, the third term, which must replace the corresponding one in the *Théorie* (same page as before), is

$$-\frac{75}{32}\,b^4\int(\varepsilon'^2-\mathrm{E}'^2)\,d\,\nu$$

instead of

$$+\frac{75}{32}\,b^4\int(\varepsilon'^2-\mathrm{E}'^2)\,d\,\nu$$

Hence the correct expression for the secular equation of the mean motion of the moon to terms of the fourth order, is as follows:—

$$\int\zeta\,d\,\nu=\left(\frac{3}{2}m^2-\frac{3771}{64}\,m^4-\frac{99}{128}\,m^2\,e^2+\frac{447}{128}\,m^2\,\gamma^2-\frac{75}{32}\,b^4\right)\int(\varepsilon'^2-\mathrm{E}'^2)\,d\,\nu$$
$$+\frac{15}{8}\,m^2\int(\varepsilon'^4-\mathrm{E}'^4)\,d\,\nu\,*$$

* In Plana's Memoir, this term has for its coefficient $\frac{15}{2}$, which is presumed to be error.

instead of

$$\int \zeta\, d\nu = \left(\frac{3}{2}m^2 - \frac{2187}{128}m^4 + \frac{1461}{128}m^2 e^2 + \frac{525}{128}m^2\gamma^2 + \frac{75}{32}b^4\right)\int(\varepsilon'^2 - \mathrm{E}'^2)\, d\nu + \frac{15}{8}m^2\int(\varepsilon'^4 - \mathrm{E}'^4)\, d\nu$$

as it stands in the *Théorie*, vol. ii. p. 852.

With regard to these results M. Plana observes :—

"The calculation of the last three terms requires considerations more delicate than those for the term multiplied by m^4. The agreement which I now obtain with respect to the term multiplied by m^4, proves the correctness of my preceding calculations; otherwise it would have been impossible to cause the discordance to disappear by this *simple addition* of the terms, which I have calculated in this note, by the assistance of my formula [1] resulting from the analysis which I have explained in pages 60 and 61 of the first volume of my work."

M. Plana, after obtaining by analysis the periodical terms multiplied by $\frac{d\varepsilon'}{d\nu}$ in the expression for the mean longitude, and showing that they are insensible, concludes with the following remarks:—

"I reserve for another time the calculation of the terms of the fifth, sixth, and seventh orders, which ought to be added to those which I have already calculated, in order to complete, to the last order at least, the co-efficient of the secular equation of the mean motion of the moon. The formulæ which I have established in this note are important for directing the choice of arguments and of the terms of their co-efficients, which must be considered in order to comprise in this definitive result all the quantities of the same order. For the present, it is sufficient for me to have completed the calculation of terms of the fourth order, indicating at the same time the sources from which may be derived the following terms by the aid of the different functions which are developed in my work. This greater precision is necessary that we may be in a condition to verify, not only by observations of eclipses, but also by those of the *libration* separated by intervals of several thousand years, that the secular equation in question is communicated by the attraction of the earth to the mean motion of rotation of the lunar spheroid with such uniformity, that it will always be impossible to see the hemisphere opposite to that which the moon now presents to us."

Notice of the Observatory of the Collegio Romano.

The Council have been favoured, by the courtesy of Mr. G. Rennie, with a communication of some particulars of the present state of the Observatory at Rome, which he obtained from Professor Secchi during a recent visit to that city. The original account in Italian has been translated by the ladies of Mr. Rennie's family, and is accompanied by two plans, one a horizontal, and the other a vertical section of the building through the observing-rooms, from which a very good idea of the establishment may be procured. The account, as transmitted to the Council, being too long for insertion in the *Monthly Notices*, has been condensed into the following form.

The Jesuit College is situated immediately at the east extremity of the church of St. Ignatius. In the original design of this church, it was intended that a cupola of $58\frac{1}{2}$ feet (Engl.) in diameter should crown the east end of the church; and pilasters of solid masonry, and of a section of about 520 square feet, were introduced into the structure for its support. This cupola, having never been built, owing to change of plans consequent on the premature death of Cardinal Ludovici, advantage has been taken of the solid foundation intended for it, to erect thereon, at about the level of the roof, piers and observing-rooms for the astronomical instruments, possessing all that is necessary, in the way of elevation, horizon, and convenience of access from the College.

The principal observing-rooms are the meridian circle-room and the dome for the large equatoreal. The former is of elliptic section, measuring about 23 feet in length, north and south, by 16 in width, and contains three fixed instruments and two clocks, one going in sidereal, the other mean time. The three instruments mentioned are placed on three piers, ranged north and south, under the roof-opening, which is common to them all. Near to the south shutter is a transit instrument of 4 feet focal length, by Reichenbach, mounted on a cast-iron stand, bedded in masonry; and so contrived that the pier may be turned round through 90 degrees, if desired, for observation in the prime vertical, without losing, after refixing, its character of a stable support. In the centre is placed the meridian-circle, by Ertel, for a description of which the reader is referred to the Memoirs of the Observatory. The focal length of the telescope is 5 feet, and the diameter of the circle $27\frac{1}{2}$ inches. Since the former description was written, some additions have been made to the micrometrical parts of the wire-frames; and provision has been made for illuminating the wires in a dark field at night. The graduated circle and the reading apparatus is cased in with a covering of bright metal to ensure equable and slow distribution of varied temperature. In this case are four small shutters in the direction of the illuminating rays, which are opened in succession when a reading has to be

taken, and are then closed again. The additional precaution has also been taken of so distributing the four windows, that the light and heat coming from without may fall about equally on all parts of the instrument. The third instrument, occupying the north end of the room, is a collimating telescope for the Ertel circle, which is partly used for checking the position of the meridian instrument at times when observations of the polar stars have not been obtained. As the stability of the collimator, however, in itself could no more be relied on than that of the meridian instrument, there is joined to the collimator a second telescope, directed constantly on an object-glass, and mark distant (northwards, probably) about 550 yards. It is assumed that the collimator and its companion move together; and that the changes of position of the one may be attributed to the other.

Professor Secchi remarks, that in a recent examination the iron trough used for the mercurial horizon was found to be strongly magnetic, and that, in consequence, he thinks, the glass troughs, formerly in use, to be preferable.

The equatoreal room is circular, and 25 feet in diameter, surmounted by a movable roof, in the form of a cylinder, covered in with a segment of a sphere. The construction of this dome is described at much length; but, possessing no peculiar feature of novelty, may be omitted. Its shutters are conveniently opened by winch-work and chains, and closed again by merely reversing the movement. An excellent horizon for the equatoreal is obtained by raising the room, so that the centre of motion of the telescope is above the level of the roof of the meridian room, while the meridian of the latter is not interfered with by the dome in consequence of the two not being quite north and south. The equatoreal, which is the first and largest of its kind in Italy, is precisely similar to the one at Pulkowa, excepting in size. The mounting appears to be very similar to that of the Oxford heliometer in this country, every important bearing being provided with friction-wheels and counterpoises, after the German fashion. The whole is carried round by a driving-clock, of the excellent performance of which Professor Secchi speaks in terms of great praise. The rate of the regulating part of this movement is controlled by the friction of two small brass balls against the sides of a conical box, in a way which many readers of the *Monthly Notices* have probably themselves witnessed. The object-glass of the equatoreal has an effective aperture of 9 French inches, and is not found to be in any degree improved in performance by the application of diaphragms to diminish the full opening. The focal length is 14·2 English feet. The telescope is provided with various positive and negative eyepieces, ranging from about 100 to 1000 in magnifying power. In the observation of very faint objects Professor Secchi has not been entirely satisfied with the means for illuminating the wire-frame, the observer always, more or less, finding himself annoyed by stray light about the room; and, after various experiments, expresses his intention of applying internal

illuminations by rendering a piece of platinum wire incandescent by galvanic current.

Besides the above rooms and instruments, there is a vacant turret on the roof of the church, which is used on the site for a small telescope by Cauchoix, employed for open-air observations; and within the Observatory are stored various theodolites, toises, surveying instruments, quadrants, and chronometers.

There is a complete collection of instruments in use for meteorological observations; and the precaution is taken of always having a duplicate of each in store to prevent interruption of the records by the derangement or breakage of thermometers. A zinc-ball is also in regular use; for which the mean-time clock in the transit-room is used, and by which the instant of noon is daily signalled to the city.

In the Library of the Observatory are kept all the books and maps in frequent use; and generally the more modern works belonging to the Observatory, while the more ancient works, forming a rich collection, are preserved near at hand in the Library of the College.

A very beautiful copy of a drawing of the large lunar crater, *Copernicus*, executed with great labour and success, was also presented to the Society at the same time by Professor Secchi, and greatly admired by those members of the Society, who were present on the occasion when it was laid on the table.

Catalogue of 53 Variable Stars, with Notes. By Norman Pogson, Assistant at the Radcliffe Observatory. (*From* Vol. XV. *of the Radcliffe Observations.*)

It has been stated at p. 177, that this Catalogue was prepared by Mr. Pogson during his leisure hours, and was originally intended solely for his own private use. So complete a compendium of the results which have been established in this interesting branch of astronomy, cannot fail to be acceptable to astronomers generally. It contains the mean place of each star for the year 1860, with the annual variations in right ascension and north polar distance; the magnitudes at maxima and minima; the mean period in those cases wherein such has been ascertained; the discoverer of variability; and, lastly, the date of discovery. The notes appended to the Catalogue contain a variety of useful details. Of the variable stars which have been discovered by Mr. Pogson himself, one of the most interesting is the star 24 *Ceph.* (*Hev.*), which has been confounded by Lalande and other astronomers with λ *Ursæ Minoris*, but which Mr. Pogson has shown to be in reality identical with No. 3402 of the Astronomer Royal's edition of Groombridge's Catalogue. We extract the following from Mr. Pogson's Notes:—

"36. *S. Ophiuchi.* This star was first seen at the Radcliffe Observatory, as a 10th mag. on 1854, May 6. In June 1853,

I had carefully constructed and revised this portion of a manuscript chart, taking in all stars down to the 12th inclusive, and am sure, that if visible at all, at that time it must have been too faint for insertion in my chart. The third night after its recognition it was very little under a 9th, after which it rapidly faded away, no trace remaining by the middle of June. It continued invisible through July, August, and September, of that year. In April and May 1855 it was still invisible, and therefore less than 13·5, my limit of vision with the equatoreal of 7·2 inches aperture. On June 9 it reappeared, strictly as a *minimum visibile*. It must have attained a maximum some time in August; for on September 10 and 12 it had again diminished to the 11th. On 1856, March 7 and 11, it was 9·3. Hence the period is probably about 7 months. The colour when brightest was bluish white; no redness was remarked at any time.

"Near *S. Ophiuchi* we find one of the most remarkable vacuities in this hemisphere—an elliptic space of about 65′ length in the direction of R.A. and 40′ width, in which there exists *no* star larger than the 13th magnitude. The centre of this curious blank is situated in R.A. $16^h\ 18\frac{1}{4}^m$, N.P.D. 160° 40′, and it is impossible to turn a large telescope in that direction, and if I may so express it, view such black darkness, without a feeling that we are here searching into the remote regions of space, far beyond the limits of our own sidereal stratum."

"42. 2896 *Gr.* This star, which is in the same field of view with *θ Cygni*, was observed 4 times by Groombridge in 1811, and recorded by him as of 7·5 mag. It was frequently looked for with the meridian instruments of the Radcliffe Observatory between 1841 and 1845, but not seen. In Argelander's Zone 21, observed on August 16, 1841, we find the two bright stars preceding, but not this one. On August 27, 1852, having set for its place with the transit instrument, I was surprised to find it bright, and easily observable with full illumination, certainly not much under the 7th mag. I have since obtained upwards of 120 comparisons on different nights. A graphic projection furnished the period given in the table, which, though only approximate, agrees very well with the dates of Groombridge's observations. The curve of variation is remarkably steady in its march. The increase from 13·5 mag. to maximum is performed in less than 100 days, but the diminution between the same limits occupies above 200 days. It is under 13·5, and therefore invisible in our equatoreal, for about 100 days; but I have good reason to infer from my projection that it does not go below the 14·3 mag., in which case it would never be quite lost to a 10-inch object-glass. At maximum it is of a dull red colour, but when near its vanishing point is perfectly free from the hazy appearance presented at such times by most other variable stars. A well-watched maximum occurred on 1854 Nov. 1, and another in Dec. 1855. A small star (10th mag.) 1′·5 np. 2^s, being equally affected by the brightness of *θ Cygni*, is the best reference star for photometric com-

parisons with the variable, when they do not differ above 1 or 2 magnitudes in brightness."

"49. *δ Cephei.* Argelander considers this the most regular of all known variables, and has given for its period $5^d\ 8^h\ 47^m\ 39^s{\cdot}5$. In 1851, Mr. Johnson made a series of photometric measures of *δ Cephei* with the heliometer, which are given in Vol. xii. of the *Radcliffe Observations*. He thence deduced for the epoch of maximum, 1851, Aug. 22·84, and the period, $5^d\ 6^h\ 42^m\ 18^s{\cdot}4$, which has been adopted in the table. Either period will reconcile distant observations equally well, but that deduced by Mr. Johnson was more in harmony with the results of his consecutive series than Argelander's. The interval between maximum and minimum is 2·95 days."

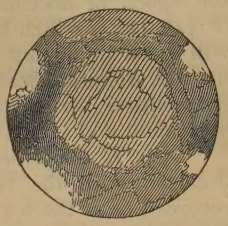
"53. *R Cassiopeiæ.* This star was first observed by Mr. Johnson with the transit instrument on 1850, Nov. 29, and recorded as of the 6·5 mag. In 1852 it was several times looked for, but not seen, and accordingly supposed variable, but not proved to be so till September 1853, when I found it sufficiently bright (8·5) to bear observing with tolerable illumination. It rapidly diminished, falling through 3 entire magnitudes in about 40 days. In May 1854 it as rapidly increased, till about the end of June, when it was a fine flashing 7th mag., *vividly red,* forming a striking contrast to the white stars of similar magnitude in its neighbourhood. It occupied about 190 days in gradually diminishing to the 11th mag., when it began to waver, and show much unsteadiness till its disappearance, about the middle of Feb. 1855. After remaining invisible for 60 or 70 days, it reappeared as an extremely faint and hazy-looking object, which, when adjacent minute points of light were quite distinct, always seemed to be out of focus. At its last maximum, in September 1855, it was of a deep rich red or crimson. In comparing it photometrically by the method of reduced apertures with the two white stars 8307 and 8326 B.A.C. I learnt a curious fact. When *R Cassiopeiæ* was unmistakeably brighter than the former, and estimated exactly equal to the latter of these two stars, on gradually reducing the aperture of my object-glass, the variable was the first to vanish, however frequently the measure was repeated. Hence it appears, that of two stars, apparently equal in size or brightness, but one white and the other red, the white one is visible through a smaller aperture than the red one. It has since occupied nearly four months in diminishing to the 9th mag. *R Cassiopeiæ* is a double star; the companion being about $0''{\cdot}8$ np. 1^s, of the 11th mag. and not variable. On account of its intense colour, this is unquestionably the most remarkable variable yet found at this Observatory."

Mr. Pogson concludes his paper with a detailed account of the method of observation practised by him.

Note on the Telescopic Appearance of the Planet Mars. By the Rev. T. W. Webb.

(Extract of a Letter to Mr. De La Rue.)

"I have had two or three pretty good views of *Mars*, and was much interested by finding that at one time (about April 15) there were, besides the pole, three other brighter spaces close to the limb, giving *something like* the effect I have attempted to sketch. Curiously enough, when last in London, I found an old figure of *Cassini's*, in which a similar appearance is represented (as far as the bright spots are concerned), and one could almost think that such may have been the origin of the ancient observation (I forget at this moment by whom) of *Mars*, as a 'quadrilateral rock vomiting fire.' This, however, would, perhaps, be ascribing too much perfection to the earliest refractors.



"*Tretire Rectory, May* 8, 1856."

Elements of Harmonia. By M. C. F. Pape.

Epoch 1856, May 1·45198 M. T. Berlin.

	°	′	″	
M	193	8	43·3	
π	10	45	38·2	M. Equinox,
Ω	93	8	17·6	January 0·0, 1856.
i	4	17	3·2	
φ	2	45	11·0	
Log a	0·355603			
Log μ	3·016603			

Captain Shee continues to observe the Solar Spots every day on which the sun is visible, and forwards his observations to the Society. These consist merely of eye estimations of the relative positions of the spots, and do not lay claim to any accuracy, but perhaps they may be useful to some extent in confirming or disproving conclusions derived from other sources.

Professor C. Piazzi Smyth has been authorised by Government to proceed to the Island of Teneriffe for the purpose of making Physico-Astronomical Observations on the summit of the Peak. The Council of the Society have been invited to furnish suggestions calculated to promote the objects of this expedition.

The Minor Planets.

Lieut. Maury, U.S.N., in a letter to Dr. Peters, which appears in No. 1026 of the *Astronomische Nachrichten*, proposes to astronomers a division of labour with respect to the observations of the Minor Planets. In pursuance of this plan he pledges the Washington Observatory for the requisite observations of eight of those bodies, selecting for this purpose *Egeria*, *Irene*, *Phocea*, *Fides*, *Psyche*, *Melpomene*, *Circe*, and *Thetis*.

He adds that in the meantime observations will be made at the same observatory of as many as practicable of the other members of the family, during the first and second oppositions succeeding discovery.

Dr. Peters responds to this proposal by announcing that henceforward the following eight planets will be regularly observed at the Altona Observatory:—*Hebe*, *Iris*, *Hygeia*, *Eunomia*, *Parthenope*, *Fortuna*, *Amphitrite*, *Lætitia*.

A gentleman wishes to dispose of a $5\frac{1}{2}$-foot refractor by the younger Tulley. It has an aperture of 3·7 inches, and is equatoreally mounted. It will elongate satisfactorily 36 *Andromedæ*, and show 31 *Canis Minoris* (Bode), in contact or just separated. For further particulars apply at the Apartments of the Society.

ERRATA.

Page 152, line 18, *for* objections *read* observations.

— — 30, *for* η^2 *Andromedæ*, *read* γ^2 *Andromedæ*.

CONTENTS.

Page

Discovery of a New Planet, by M. Goldschmidt 167

Observations of Double Stars taken at Madras in 1854–56, by Mr. Eyre B. Powell ... ... ib.

Observed Right Ascensions and North Polar Distances of recently discovered small Planets at the Royal Observatory, Greenwich 172

Note on Variable Stars, by Mr. A. D. Wackerbarth 174

Description of an Observatory erected at Upper Tulse Hill, by Mr. Huggins 175

Observations of Planets at the Cambridge Observatory 176

Astronomical and Meteorological Observations made at the Radcliffe Observatory, Oxford, in the year 1854, under the superintendence of Manuel J. Johnson, M.A. 177

Abstract of a Note by M. Plana on the correction of an error in his "Théorie du Mouvement de la Lune" 178

Description of the Observatory of the Collegio Romano 183

Catalogue of 53 Variable Stars, with Notes, by Mr. Norman Pogson ... 185

Note on the Telescopic Appearance of the Planet *Mars*, by the Rev. T. W. Webb 188

Elements of *Harmonia*, by M. C. F. Pape ... ... ib.

Solar Spots observed by Captain Shee ... ... ib.

Proposed Physico-Astronomical Observations on the Summit of the Peak of Teneriffe 189

Proposed Division of Labour with respect to the Observations of the Minor Planets, by Lieut. Maury ... ... ib.

London :—Printed by G. Barclay, Castle St. Leicester Sq. and Published at the Apartments of the Society, June 6, 1856.